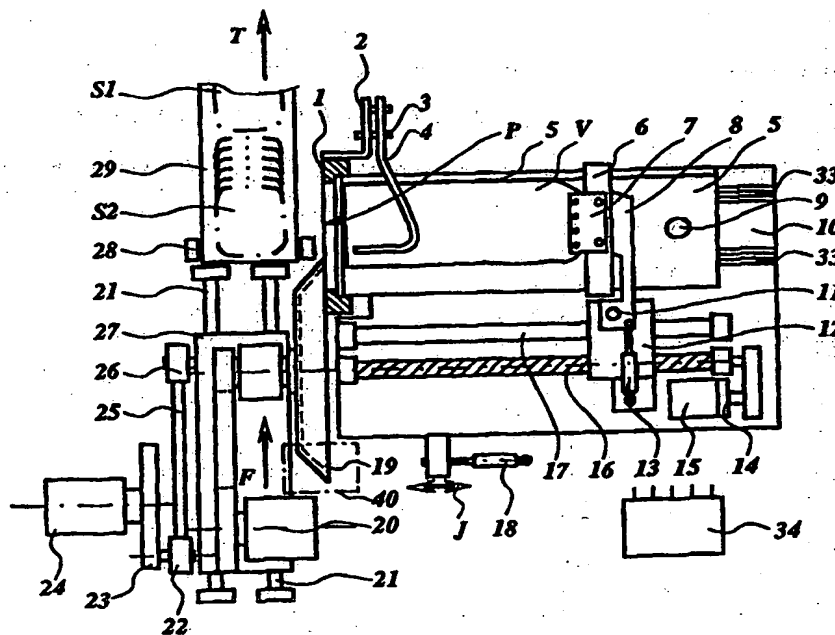




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : B26D 7/06, 7/01	A1	(11) International Publication Number: WO 00/06349 (43) International Publication Date: 10 February 2000 (10.02.00)
(21) International Application Number: PCT/NL99/00434 (22) International Filing Date: 7 July 1999 (07.07.99) (30) Priority Data: 1009772 30 July 1998 (30.07.98) NL (71) Applicant (for all designated States except US): FOOD-CORNER INTERNATIONAL B.V. [NL/NL]; Schoenaker 10 b, NL-6641 SZ Beuningen (NL). (72) Inventors; and (75) Inventors/Applicants (for US only): DESSING, Jacobus, Petrus, Maria [NL/NL]; Kruisweg 1483, NL-2142 LA Cruquius (NL). DE GRAAF, Mattijn, Godewijn [NL/NL]; Kruisstraat 17, NL-2312 BJ Leiden (NL). OOSTERLING, Pieter, Adriaan [NL/NL]; Sikkelstraat 53, NL-2151 CP Nieuw-Vennep (NL). (74) Agent: UITTENBOGAART, Gustaaf, Adolf; Indeig B.V., P.O. Box 3, NL-2050 AA Overveen (NL).		(81) Designated States: JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>In English translation (filed in Dutch).</i> 03 Y 1 S. 4 11-15

(54) Title: METHOD AND DEVICE FOR CUTTING FOODSTUFFS INTO SLICES

**(57) Abstract**

The invention relates to a method and device for cutting foodstuffs into slices. When cutting foodstuffs (V), the thickness of the first slice and the last slice is often not uniform. According to the invention, this situation is improved by displacing the foodstuffs (V), and optionally the support thereof (5), towards the cutting plane (P), prior to the beginning of the first cut, between two cutting movements, by a distance (a) which is greater than the thickness of the slice, and by moving them the same distance back after the cutting operation.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

Method and device for cutting foodstuffs into slices

The invention relates to a method according to the preamble of Claim 1. A method of this nature is known
5 from EP 0,412,295. In the known device, it is often the case that when the first slice is cut, its thickness is not sufficiently uniform, or even only part of this slice is cut off. This is because during the first cut the foodstuffs, in certain areas, do not always project
10 sufficiently through the cutter frame, and consequently become too thin.

The object of the invention is to improve this situation, and to this end the method is carried out as
15 described by the characterizing part of Claim 1. As a result, when the first slice is cut, it may immediately acquire a uniform thickness, so that there are no frayed edges or half-cut slices on the foodstuffs when the last slice is cut.

20 The characterizing part of Claim 2 describes an improved method. In this way, the foodstuffs are always pushed against the support during cutting, with the result that they are supported appropriately in the
25 cutter frame and will not slip, for example during the rapid movement before the first slice is cut.

The invention also relates to a cutting device according to the preamble of Claim 3. A meat-cutting
30 device of this nature is known from the above mentioned European Patent Application. The drawback of the known device is that the thickness of the first and last slices which it cuts is not uniform. When the device is used in situations in which the portions of foodstuffs
35 cut off are always small, such as for example in a device with which a hundred grams of meat products are cut off and packaged when ordered by a customer, however, it is desirable for even the first slice and the last slice to be of the correct thickness and shape.

In order to make this possible, according to the invention the device is designed as described by the characterizing part of Claim 3. By making it possible for the foodstuff and the product carrier with foodstuff to move a short distance towards the cutter frame before beginning to cut each first slice and for them to be pulled back from the cutter frame after the cutting operation, it is ensured that a suitable slice thickness is obtained when cutting and that at the end of the cutting operation the foodstuff is removed from the path of the cutting blade, with the result that there are no frayed edges and the like formed on the foodstuff. As a result, all the slices always acquire the desired uniform thickness.

According to an improvement of the device, it is designed as described by the characterizing part of Claim 7. In this way, the foodstuff can easily slide over the product carrier and the cutter frame, towards the cutting plane, in order to be cut, with the result that it is conveyed more uniformly.

0006349A1 1 2

- 3 -

According to a further improvement, the cutting device is designed as described by the characterizing part of Claim 9. This makes the pressure means of simple design.

5

According to an improvement, the cutting device is designed as described by Claim 10. This ensures that the product carrier does not move with respect to the carriage, even when the carriage executes rapid

10 movements.

According to an improvement, the device is designed as described by Claim 12. This ensures that the cutting device is not contaminated when in automatic use and that undesirable contamination with bacteria is avoided.

15

The invention is explained below with reference to an exemplary embodiment which is shown in a drawing, in which:

20

Figure 1 shows a diagrammatic plan view of a cutting device,

Figure 2 shows a diagrammatic side view of the cutting device from Figure 1,

25

Figure 3 shows a detail of the cutting device from Figure 1, in the situation before and after cutting, and

Figure 4 shows a detail corresponding to Figure 3 in the situation during cutting,

30

Figure 5 shows a diagrammatic cross section through a device for cleaning the cutting blade of the cutting device from Figure 1 and

Figure 6 shows a side view of the device from Figure 5.

35

The cutting device shown, which can be used to cut meat products, may form part of the device for automatically cutting foodstuffs as described in EP 0,470,673 and in which foodstuffs are stored on a product carrier which

- 4 -

is described, inter alia, in the application PCT NL 9900237, which is not a prior publication, from the same applicant, the contents of which are hereby deemed to be incorporated.

5

Figure 1 shows a plan view of the cutting device, which is attached to a base 32 which can be seen in the side view shown in Figure 2. Rectilinear guides 31, to which a cutter carriage 10 is attached, are arranged on the base 32. By means of a cylinder 18, the cutter carriage 10 can be moved a distance a in a feed direction J . The distance and therefore the travel of the cylinder 18 can be set between 3 and 10 millimetres and is preferably set at 5 millimetres.

15

On the cutter carriage 10, a product carrier 5 is positioned at a fixed position with the aid of a positioning pin 9. In a manner which is not described in more detail, the product carrier 5 is placed on the
20 cutter carriage 10, for example by being pushed into guide rails 33, which are present on the cutter carriage 10, by means of a conveyor system (not shown), it being possible for that side of the product carrier 5 which faces towards a cutting plane P, after it has
25 been positioned on the cutter carriage 10, to be supported on a cutter frame 1 which is attached to the base 32. For this purpose, the cutter frame 1 and/or the product carrier 5 are provided with bevels (not shown), so that while the product carrier 5 is being
30 pushed in along the guide rails 33, the edge of the product carrier 5 enters the cutter frame 1. The cutter frame 1 is provided with a recess in which the product 5 can be supported, in such a manner that the inside of the cutter frame 1, at the location of the cutting
35 plane P, forms a single plane with those surfaces of the product carrier 5 which support the foodstuff V.

On the product carrier 5 there is positioned foodstuff V, of which the end remote from the cutting plane P is

- 5 -

attached to a slide 6 by means of a clamp 7. A gripper 8 is attached to the slide 6 and is able to rotate about a pivot pin 11 by way of a pivot cylinder 13. The pivot pin 11 and the pivot cylinder 13 are attached to a feed carriage 12. The feed carriage 12 can be moved along a guide shaft 17 with a threaded spindle 16 which is driven by a motor 15. The position of the feed carriage 12 is recorded in a control unit 34 by means of an encoder 14 which is coupled to the motor 15.

10

The gripper 8 is provided with clamping means, by means of which it is coupled to the slide 6, and with sensors, which are used while the gripper 8 is being coupled to the slide 6.

15

A bracket 2 is attached to the cutter frame 1, and an arm 4 is attached to the bracket at a rotation point 3. This arm 4 presses the foodstuff V against the horizontal and vertical support surfaces of the product carrier 5 and, to this end, is actuated by the cylinder 30 (cf. Figure 2).

A rotating cutting blade 19 and a motor 20, which is coupled thereto, are assembled on a carriage 27 which is able to execute a cutting movement F along guide shafts 21. For this purpose, a carriage pin 26, which is coupled to a crank pin 22 by a connecting rod 25, is attached to the carriage 27. The crank pin 22 is attached to an eccentric wheel 23 which is driven in rotation by a motor 24.

The cutting edge of the rotating cutting blade 19 moves past the cutter frame 1 in the cutting plane P. The cutter frame 1 is preferably made from plastic, so that it cannot damage the rotating cutting blade 19.

The slices of foodstuff V which are cut off by the rotating cutting blade 19 fall onto a conveyor belt 29 which, by means of a drive (not shown), can be moved in

a conveying direction T. The slices of foodstuff cut off can be laid on the conveyor belt 29 in a group S1 or S2, which can then be packaged as a whole. The conveyor belt 29 is attached to the base 32 by means of conveyor-belt supports 28. If appropriate, the conveyor 29 may be provided with means (not shown) for weighing the group of slices S1 or S2 which have been cut off and with recording means, such as for example an encoder, for recording the position where a specific group of slices, such as S1 or S2, is located on the conveyor belt 29.

At the beginning of the operation of cutting a group of slices, the product carrier 5, together with the foodstuffs V, is pushed into the guide rails 33 and fixed on the cutter carriage 10 by means of the positioning pin 9. If appropriate, a clamp may be used instead of the positioning pin 9. The gripper is pivoted above the product carrier 5 by means of the pivot cylinder 13, and with the aid of the threaded spindle 16 the feed carriage 12 moves in the direction of the cutting plane P. The sensors which are mounted on the gripper 8 detect the approach of the slide 6. If appropriate, the position of the slide 6 may be known from the memory of the control unit. In one embodiment, an identifier is to this end arranged on the product carrier 5, which identifier is detected by recognition means positioned on the cutter carriage 10.

- 7 -

After the gripper 8 has moved closer to the slide 6, these two components couple together, for example as a result of the gripper 8 containing electromagnets which act on a steel strip arranged in the slide 6. Due to the fact that, during the previous occasion on which the meat products present on the product carrier 5 were cut, the movement of the slide 6 was always towards the cutting plane P, and therefore there is no play between foodstuff V and slide 6, the foodstuff V will move as soon as the slide 6 is moved towards the cutting plane P.

Then, the rotating cutting blade 19 is started and the eccentric wheel 23 is set in rotation, with the result that the carriage 27, with the rotating cutting blade 19 mounted thereon, starts to execute a reciprocating movement past the cutter frame 1. The foodstuffs V are pressed against the product carrier 5 by the arm 4. Between two cutting movements of the cutting blade 19, the cutter carriage 10 is moved towards and through the cutting plane P by means of the cylinder 18, with the result that the foodstuff V projects outside the cutter frame 1 and a slice is cut off.

The slide 6 is moved towards the cutting plane P continuously or intermittently, synchronized with the cutting movement F, so that slices are cut off. The slices fall onto the conveyor belt 29, where they are weighed if appropriate.

By providing the conveyor belt 29 with optionally an alternating conveying direction T, the slices can be stacked in different ways so as to form a group S1 or S2.

After it has been established by the control unit 34 that sufficient slices have been cut off, the movement of the slide 6 stops, and the cutter carriage 10 is moved away from the cutting plane P, by means of the

- 8 -

cylinder 18, between two cutting movements of the cutting edge of the cutting blade 19, with the result that the foodstuff V is moved out of the cutting plane P. Since, in the process, the entire product table 5, with the product positioned thereon, is moved, there is no change in the contact between the foodstuffs V and the slide 6. Also, this movement does not impose any load on the clamp 7, and the clamp 7 does not pull on the foodstuff V.

10

To provide a more detailed illustration of how the device operates, Figure 3 shows how the product carrier 5 is positioned with respect to the cutter frame 1, the meat products also being supported by a cutter-frame edge 35, but not yet projecting through the cutting plane P, so that the cutting blade 19 can move past without cutting.

15

Figure 4 shows the situation during cutting, in which the product carrier 5 has been pushed further into the cutter frame 1 as a result of the displacement of the cutter carriage 10, and the meat products V then project through the cutting plane P, and the cutting blade 19 is able to cut off a slice. During this cutting operation, the meat products V are supported by the cutter-frame edge 35.

20

25

The design discussed here can be used in particular in situations in which the cutting movement F takes place regularly, in succession, and cannot readily be stopped. This is usually the case for systems in which the cutting device has to have as high capacity.

30

As mentioned above, the arm 4 presses the foodstuff V against the product carrier 5. With some products, it is important, when pushing the foodstuff V towards the cutting plane P using the slide 6, to relieve the load on the arm 4 slightly, so that the foodstuff V slides with little resistance. To this end, the control unit

35

- 9 -

34 is provided with means for synchronization between the movement of the cutting blade 19 and the circuit of the cylinder 30.

5 The exemplary embodiment shown here depicts a rotating cutting blade 19 which moves in rectilinear fashion past the cutter frame 1. Other manners of movement of cutting edges are also possible, such as a rotating blade with helical cutting edges, in which the cutting
10 movement F is produced by the helical shape. Another possibility is an orbital blade in which one or more rotating blades are attached in a holder which is able to rotate about an axis which is parallel to the axis of rotation of the blades.

15

In order to ensure that the slices cut off fall as flat as possible onto the conveyor belt 29, the cutting plane P may be inclined, for example at an angle of 30°, with respect to a vertical plane. This does not
20 change the operational principle of the device described above.

The device is described in such a manner that meat products are thought of in particular when cutting off
25 slices of foodstuffs. However, it is also possible for the device to be made suitable for other foods, such as for example cheese.

In addition to being used in a device in which the product carriers 5 with foodstuffs are supplied
30 automatically with the aid of a conveyor system and in which, for example, different types of foodstuffs are always being cut off, the device may also be used in situations in which it is always necessary to make many groups of slices of one type of foodstuff, and these
35 groups of slices are subsequently packaged separately. In this situation, a new product carrier 5 may be supplied manually. It is also conceivable for the product carrier 5 and the cutter carriage 10 to form a

- 10 -

single unit or, if appropriate, for new meat products V to be placed manually on the product carrier 5 and coupled to the slide 6. In this situation too, the force between the meat products V and the slide 6 remains constant before, during and after cutting, since it always moves in one direction and the entire cutter carriage 10 is pulled away from the cutting plane P.

Figures 5 and 6 diagrammatically show a cleaning device 40 which is used for automatically cleaning the cutting blade 19. The cleaning device is, for example, positioned directly beneath the centre of the cutting blade 19 when the carriage 27 is furthest away from the cutter frame 1. In Figure 1, this location is indicated by dot-dashed lines.

The cleaning device 40 comprises two symmetrical frames 41 and 42 which are attached in a frame 52 in such a manner that they can pivot about a common pin 43. Each frame 41 or 42 is composed of two frame plates 44 which are coupled to one another by the coupling pieces 45 and 46. Two slightly spherical rolls 47, around which an endless support belt 48 is mounted, are mounted between the frame plates 44. A strip of paper P is fed around the support belt 48. The strip of paper P is unwound from the stock reel 51 and then runs along a first support roll 49, around the support belt 48 and along the second support roll 49, and then towards waste reel 50. The waste reel 50 is driven by a drive 53.

In order for the cutting blade 19 to be cleaned, the cutting blade 19 is introduced between the support belts 48. If appropriate, the drives 53 are first switched on for a short time, so that the cutting blade 19 can be clamped between two clean strips of paper P. Then, a cylinder 53A is actuated, so that the support belts 48, together with the paper strip P, move towards

- 11 -

the cutting blade 19. At the same time, the cutting blade 19 is rotated, so that the dirt is wiped off by the paper strip P. If appropriate, the paper strip P is impregnated with alcohol or another cleaning agent, so that bacteria are prevented from growing on the blade.

The frames 41 and 42 are provided, in a known manner, with means for exchanging the stock reel 51 and the waste reel 50.

10

To prevent wear to the support belt 48, it is made from hard, wear-resistant material which is provided in certain locations with a rough section for holding the paper strip P in place during the cleaning operation.

15

If appropriate, the cutting blade 19 is cleaned periodically, although it may also be cleaned each time after a specific meat product has been cut, since some meat products, such as sausages, contain bacteria which must not come into contact with other meat products, such as ham.

20

- 12 -

Claims

1. Method for cutting slices of foodstuff (V), such as meat products, by moving a cutting edge and a cutter frame (1) past one another in a reciprocating movement in a cutting plane (P), the foodstuffs (V) being pushed through the cutter frame (1) by drive means (15, 16), characterized in that, before the first slice is cut, the foodstuff (V), and optionally the support (5) thereof, between two cutting movements, is/are displaced in the direction of the cutter frame (1) over a distance (a) which is greater than the thickness of one slice and, after the last slice has been cut, the foodstuff (V), and optionally the support (5) thereof, is/are displaced the same distance (a) in the opposite direction.
2. Method according to Claim 2, characterized in that the foodstuffs (V) are pushed against a support (5) during the cutting operation.
3. Cutting device for automatically cutting foodstuff (V), such as meat products, into slices, comprising cutting means having a cutting edge, such as a cutting blade (19), and having first drive means (22-26) for moving the cutting edge in a cutting plane (P), a cutter frame (1), which is delimited on one side by the cutting plane (P), for supporting the foodstuff (V) during the cutting operation, positioning means for moving the foodstuff (V) into the cutting plane (P), comprising a product carrier (5) for supporting the foodstuffs (V), second drive means (12-16) for pushing the foodstuffs (V) through the cutter frame (1), and control means (34) for controlling the device, characterized in that the second drive means (12-16) and the product carrier (5) are mounted on a carriage (10) which can be displaced

- 13 -

with respect to the cutting plane (P) and/or the cutter frame (1) by third drive means (18).

- 5 4. Cutting device according to Claim 3, characterized in that the third drive means (18) have an adjustable travel (a) which is greater than a few millimetres and is less than 10 millimetres.
- 10 5. Cutting device according to Claim 4, characterized in that the adjustable travel (a) is approximately 5 millimetres.
- 15 6. Cutting device according to one of Claims 3-5, characterized in that, during the cutting operation, the product carrier (5) is supported on the cutter frame (1).
- 20 7. Cutting device according to one of Claims 3-6, characterized in that those surfaces of the product carrier (5) and the cutter frame (35) which support the foodstuffs (V) during the cutting operation form a common plane.
- 25 8. Cutting device according to one of Claims 3-7, characterized in that pressure means (4, 30) are provided for pressing the foodstuff (V) towards the product carrier (5) during the cutting operation.
- 30 9. Cutting device according to Claim 8, characterized in that the pressure means (4, 30) comprise a pivotable bracket (4), which may be attached to the cutter frame (1).
- 35 10. Cutting device according to one of Claims 3-9, characterized in that positioning means (9, 33) are provided for fixing the product carrier (5) with respect to the carriage (10) during cutting.

- 14 -

11. Cutting device according to Claim 10, characterized in that the positioning means comprise a clamp (9).
- 5 12. Cutting device according to one of Claims 3-11, characterized in that there are means (40) for automatically cleaning the cutting blade (19).

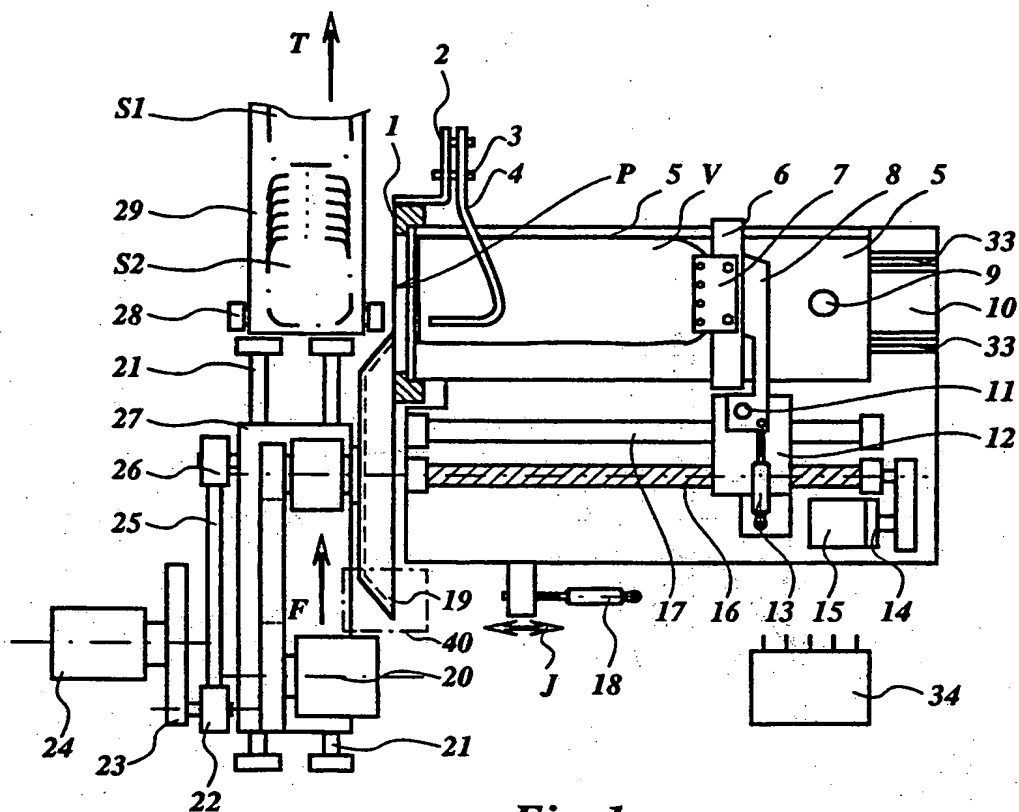


Fig. 1

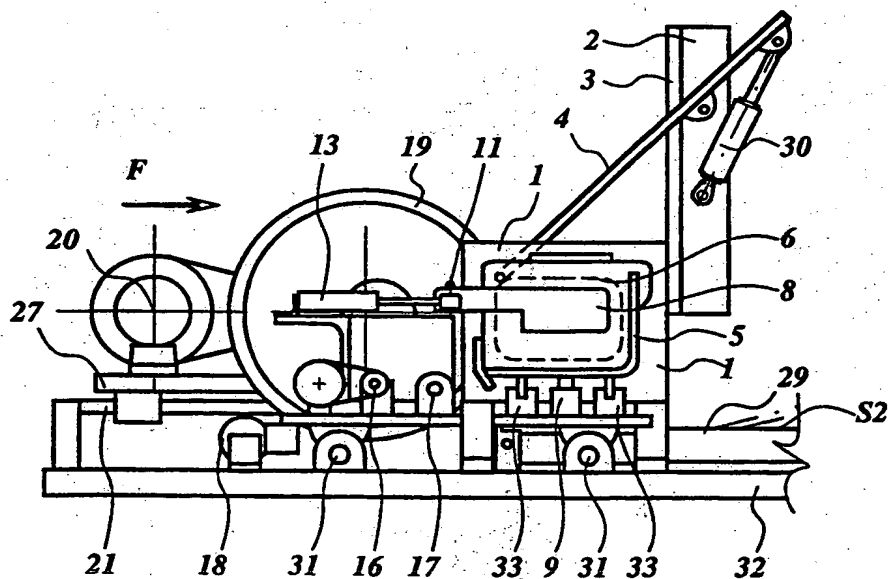
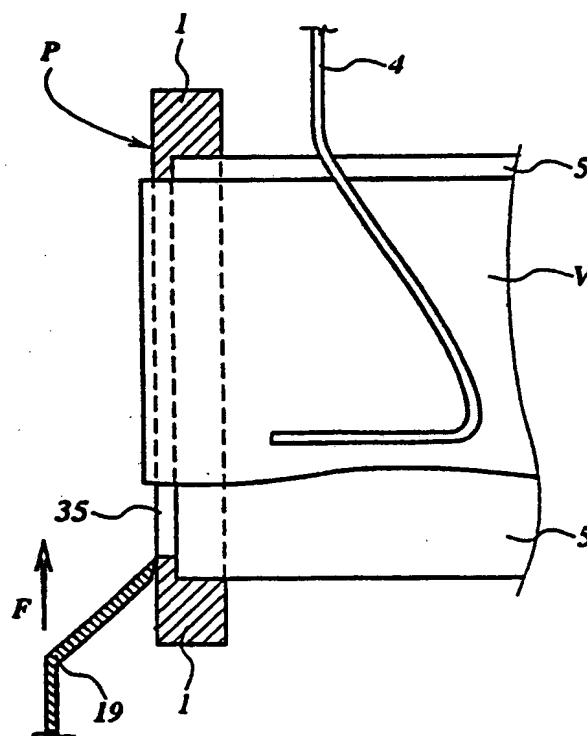
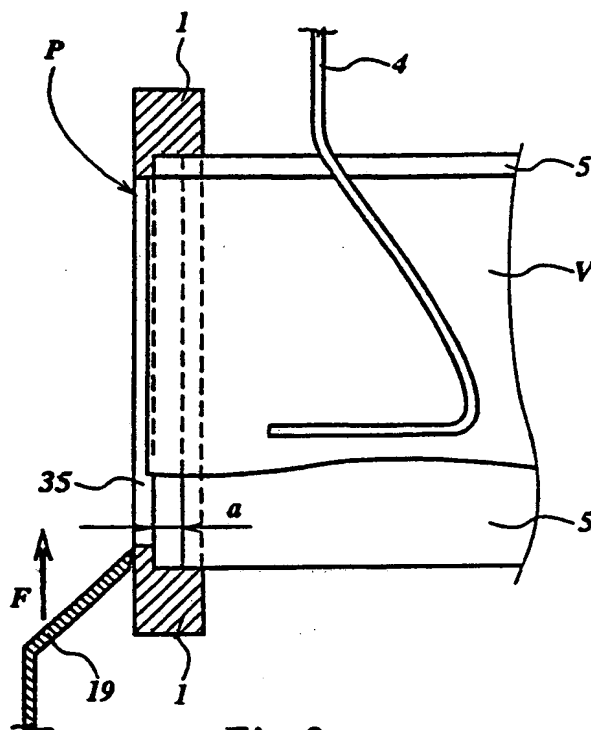


Fig. 2



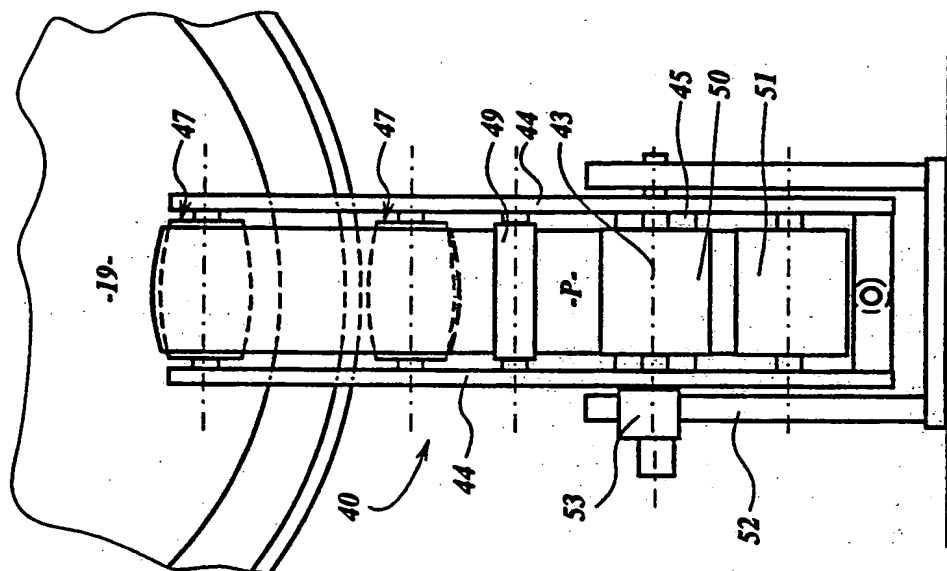


Fig. 6

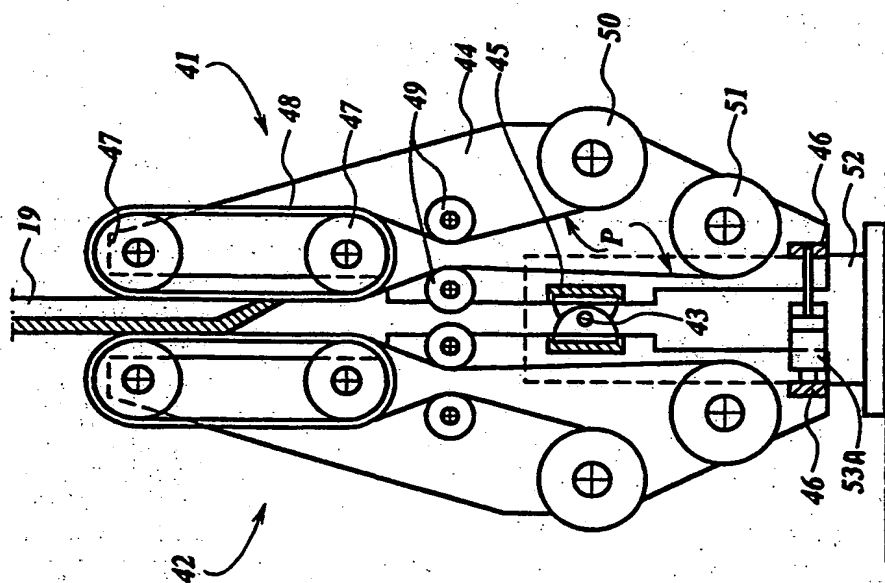


Fig. 5

INTERNATIONAL SEARCH REPORT

International Application No
PCT/NL 99/00434

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B26D7/06 B26D7/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B26D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 289 765 A (WEBER GUNTHER) 9 November 1988 (1988-11-09)	1,3,4,10
Y	the whole document	2,7,8,12
Y	EP 0 713 753 A (FORMAX INC) 29 May 1996 (1996-05-29) figure 8	2,7,8
Y	DE 41 33 043 A (TOKARSKI BERNHARD) 8 April 1993 (1993-04-08) the whole document	12
X	US 4 523 501 A (MENGEL RONALD E) 18 June 1985 (1985-06-18)	1,2
A	column 4, line 50 -column 5, line 2 -/--	3

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

16 September 1999

Date of mailing of the international search report

27/09/1999

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Vaglienti, G

INTERNATIONAL SEARCH REPORT

International Application No
PCT/NL 99/00434

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 36 17 277 A (REIFENHAEUSER TONI) 26 November 1987 (1987-11-26) the whole document ----	1, 3, 10
X	WO 92 08585 A (THURNE ENG CO LTD) 29 May 1992 (1992-05-29) page 3, line 26 -page 5, line 5 ----	1
A	DE 32 32 045 A (WARNKE KURT) 1 March 1984 (1984-03-01) page 12, line 10 - line 16; figures ----	6
A	DE 24 47 836 A (CASHIN SYSTEMS CORP) 17 April 1975 (1975-04-17) figure 1 -----	9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 99/00434

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0289765	A	09-11-1988	DE 3714810 A	17-11-1988
			AT 78745 T	15-08-1992
			DE 3873150 A	03-09-1992
			DK 239088 A	05-11-1988
			FI 881979 A, B,	05-11-1988
			JP 63295198 A	01-12-1988
			US 4934232 A	19-06-1990
EP 0713753	A	29-05-1996	US 5628237 A	13-05-1997
			US 5649463 A	22-07-1997
			US 5566600 A	22-10-1996
			CA 2154337 A	12-04-1996
			JP 8118288 A	14-05-1996
			US 5697275 A	16-12-1997
			US 5704265 A	06-01-1998
			US 5724874 A	10-03-1998
DE 4133043	A	08-04-1993	NONE	
US 4523501	A	18-06-1985	NONE	
DE 3617277	A	26-11-1987	NONE	
WO 9208585	A	29-05-1992	NONE	
DE 3232045	A	01-03-1984	NONE	
DE 2447836	A	17-04-1975	US 3880035 A	29-04-1975
			CA 1005328 A	15-02-1977
			GB 1473695 A	18-05-1977
			JP 50070561 A	12-06-1975